CLAIMS:

1. A cylindrical magnetron comprising:

a target tube;

a first endblock comprising:

a motor;

a gearbox; and

a drive assembly between the gearbox and the target tube with one or more axially compliant interfaces between gears of the drive assembly such that the assembly accommodates imperfect rotation of the target tube.

2. The magnetron of claim 1 further comprising:

a second endblock comprising:

an inner housing comprising:

a water cooled spindle

an electrical transfer system including brush blocks contacting the surface of the spindle.

an outer housing;

compliant seal rings between the inner and outer housing whereby the inner housing can move within the outer housing to absorb imperfect rotation of the target tube.

3. The magnetron of claim 1 further comprising:

an inner housing within the first endblock, the gearbox and drive assembly within the inner housing;

an outer housing; and

compliant seal rings between the inner and outer housing whereby the inner housing can move within the outer housing to absorb imperfect rotation of the target tube.

4. The magnetron of claim 3 wherein the imperfect rotation of the target tube includes eccentric rotation about the axis of rotation of the target tube or movement of the target tube along the axis of rotation.

5. The magnetron of claim 1 wherein the drive assembly comprises first, second and third gears, the rotating motion from the gearbox transferred from the gearbox to the first gear, the rotating motion from the first gear transferred to the second gear, and the rotating motion from the second gear transferred to the third gear.

6. The magnetron of claim 5 wherein the second gear is located between the first and third gear and is electrically insulating.

7. The magnetron of claim 5 wherein an axially compliant interface of the one or more axially compliant interfaces is between the first and second gear.

8. The magnetron of claim 5 wherein an axially compliant interface of the one or more axially compliant interfaces is between the second and third gear.

9. The magnetron of claim 5 wherein the third gear is coupled to the target tube.

10. The magnetron of claim 5 wherein the first gear has one or more slots, and wherein one or more protrusions of the gearbox rotate freely within the slots until encountering the end of the slot and thereafter rotate the entire third component.

11. The magnetron of claim 10 wherein the one or more protrusions are aligned anywhere within the one or more slots during assembly of the magnetron.

12. A sputtering device having a rotating target tube suspended between first and second endblocks, the first endblock having a suspension and drive system comprising:

a primary housing;

a secondary housing held within the primary housing by insulative and pliable components such that the secondary housing can move within the primary housing, the secondary housing comprising a system of interlocking male and female components rotating about an axis and coupling the gearbox to the target tube.

13. The sputtering device of claim 12 wherein the first endblock further comprises a gearbox held within the primary housing by insulative and pliable components such that the gearbox can move within the primary housing.

14. The sputtering device of claim 12 wherein the interlocking male and female male and female components are free to move with six degrees of freedom about the axis of rotation.

15. A device for plasma coating a substrate having a target tube that rotates about an axis of rotation, the device comprising:

a motor;

a gearbox;

a driveline linking the gearbox and the target tube, the driveline able to pivot about the axis of rotation.

16. The device of claim 15 wherein the driveline comprises one or more male and one or more female interconnecting components

17. The device of claim 16 wherein one of the male or female interconnecting components is made of an insulating material thereby insulating the motor and gearbox from the target tube.

18. The device of claim 15 wherein the driveline is further able to move along the axis of rotation to absorb imperfect rotation of the target tube.

19. The sputtering device of claim 15 further comprising a rotating shaft that transfers power to the target tube.

20. The sputtering device of claim of claim 19 further comprising one or more brush blocks that transfer power to the rotating shaft.

21. The sputtering device of claim 20 wherein the one or more brush blocks are concentrically disposed about the rotating shaft, and are compressively kept in contact with the shaft.

22. The sputtering device of claim 19 wherein cooling water flows through the rotating shaft and into the target tube.

23. The sputtering device of claim 19 wherein a non rotating shaft is within the rotating shaft, and wherein the non rotating shaft locates and supports a magnetic array within the target tube.

24. The sputtering device of claim 15 further comprising a shield connected to the primary housing and electrically isolated from the primary housing.

25. The sputtering device of claim 24 wherein the shield comprises an inner shield and an outer shield electrically isolated from each other.

26. A device for plasma coating a substrate having a target tube that rotates about an axis of rotation, the device comprising:

an electrical transfer system capable of transferring power to the target tube, the transfer system comprising:

a shaft electrically contacting and rotating with the target tube;

a brush block in contact with a first region of the shaft,

wherein water flows through the shaft and the target tube, and wherein the brush block transfers the power to the shaft and wherein current travels in a path from the brush block through the shaft to the target tube; and

a non-metallic bearing in the current path and disposed about a second region of the shaft.

27. The device of claim 26 wherein the electrical transfer system is capable of transferring both alternating and direct current.

28. The device of claim 26 wherein the second region of the shaft is coated with chromium oxide.

29. The device of claim 28 wherein the chromium oxide is diamond polished.

30. The device of claim 26 wherein the shaft is made of 304 stainless steel thereby minimizing the effects of inductive heating.

31. The device of claim 26 wherein the non-metallic bearing is a ceramic bearing that does not inductively heat.

32. The device of claim 26 further comprising first and second vacuum seals disposed about the second region of the shaft.

33. The device of claim 32 wherein the first and second vacuum seals are made of a non metallic material that does not inductively heat.

34. The device of claim 32 further comprising a switch to detect a breach between the first and second vacuum seals.

35. The device of claim 26 further comprising first and second water seals disposed about a third region of the shaft, the third region coated with chromium oxide.

36. The device of claim 35 further comprising a switch to detect a breach between the first and second water seals.

37. The device of claim 26 wherein the first region is coated with chromium oxide wear resistant coating.

38. The device of claim 26 wherein the brush block comprises graphite and copper.

39. The device of claim 26 wherein the brush block comprises four or more discrete radial segments.

40. The device of claim 39 wherein the brush block segments are held against the first surface with a spring that can be unhooked to remove the brush block segments.

41. The device of claim 35 further comprising a port between the first and second water seals whereby in the event the first seal is breached the water may flow out of the port thereby reducing the pressure on the second water seal.

42. A magnetron having a first and second endblock and a rotating target tube, the first endblock comprising:

a motor;

a gearbox electrically isolated from the motor;

a driveline within a first inner housing and having an insulating member connecting the gearbox to the target tube;

a first outer housing containing the first inner housing and electrically isolated from the first inner housing.

43. The magnetron of claim 42 further comprising a shield electrically isolated from the first outer housing.

44. The magnetron of claim 42 wherein the shield comprises an outer shield electrically isolated from an inner shield.

45. The magnetron of claim 42 wherein the second endblock comprises a water cooled electrical transfer system within a second inner housing.

46. The magnetron of claim 45 wherein the water cooled electrical transfer system is within a second outer housing and is electrically isolated from the second outer housing.

47. The magnetron of claim 44 wherein the outer shield protects against heat energy and wherein the outer shield reflects a first fraction of the heat energy in a vacuum and radiates a second fraction of heat energy in a vacuum towards the inner heat shield.

48. The magnetron of claim 47 wherein the inner heat shield receives the second fraction of radiated heat energy and radiates a third fraction of the heat energy towards the first outer housing.

49. The magnetron of claim 48 wherein the primary housing is internally cooled with forced air.

50. An endblock of a cylindrical magnetron having a target tube supplied with an electrical potential, the endblock comprising:

an isolation plate having a groove;

a shield electrically isolated from the isolation plate and the target tube and positioned between the groove and the target tube such that stray material on a trajectory from the target tube cannot completely fill the groove.

51. The endblock of claim 50 wherein the unfilled portion of the groove forms a shadow space preventing electrical transfer between the heat shield and the isolation plate.

52. The endblock of claim 50 wherein the unfilled portion of the groove forms a shadow space preventing electrical transfer between the electrical potential supplied to the target tube and other components of the magnetron.

53. A magnetron including a rotating target tube for sputtering onto a substrate comprising:

a first endblock having means for rotating the target tube, the means for rotating the target tube moveable to accommodate imperfections in the rotation of the target tube.

54. The magnetron of claim 53 further comprising a second endblock comprising means for providing electricity to the target tube, the means for providing electricity having water cooling means to cool the second endblock and the target tube.

55. The magnetron of claim 53 wherein the means for rotating the target tube comprises interlocking male and female components.

56. The magnetron of claim 54 wherein the second endblock further comprises means for supporting a stationary magnetic array within the target tube.

57. The magnetron of claim 53 wherein the means for rotating the target tube comprises means for electrically isolating the target tube from the sputtering process.

58. The magnetron of claim 54 wherein the first and second endblocks further comprise a means for shielding the endblocks from the sputtering process.

59. A magnetron having an endblock comprising a water cooled electrical transfer system within an inner housing, the inner housing within an outer housing and electrically isolated from the outer housing, the outer housing electrically isolated from a shield around the outer housing.